Salt Wise Soft Water

April 25, 2017
Emily Jones, Pollution Prevention Specialist
Madison Metropolitan Sewerage District
Today’s Takeaways

• Understand the chloride issue and importance of reducing it
• Know how to evaluate water softeners and identify improvement opportunities
• Become familiar with MMSD resources to help with salt reduction projects
• Get ideas for future improvements at your/your customers’ facilities
MMSD

- Regional, serving >350,000 people in cities, villages, towns, rural septic
- 40 million gallons per day
- Mission: Protecting public health and the environment
Nine Springs Wastewater Treatment Plant
Treatment Process

- Physical separation of solids, fats
- Biological removal of nutrients, organic matter
- Disinfection of water (warm season)
- Digestion of removed solids into fertilizer
WI Water Quality Criterion for Chloride: 395 mg/L
There is no Away

- Conserve, Protect, Reflect

The most abundant resource on the planet is water, but is it all accessible?

- 100% total water
- 3% fresh water
- 1% water available for drinking
Pollutants of Concern

- Mercury
- Salt
- Phosphorus
- Pharmaceuticals
- "Flushables," FOG

Opportunities for Pollution Prevention

Regulated – MMSD has permit limit
Chloride as a Pollutant

Can be toxic to freshwater fish and plants not adapted to a salty environment (disrupts osmoregulation)

Road salt effects on plants on land
Quiz:

About how much fresh water will be polluted by 1 teaspoon of salt?

a. 1 cup
b. 1 liter
c. 1 gallon
d. 5 gallons
That’s a Lot of Teaspoons
Chloride Sources and Relative Contributions

Estimated contributions by source:

- Water Supply: 57%
- Human contribution: 8%
- Road Deicing: 8%
- Industrial: 7%
- NSWTP chemicals, septage, hauled wastes: 2%
- Softening: 18%
Chloride on the Rise

MMSD Effluent Chloride Conc (annual average, mg/L)

MMSD’s Permit Requirements

- Discharge permit (WPDES) from WDNR includes limits for chloride concentration and mass
- Under a variance, but limits get progressively lower
  - Previous permit limit: 481 mg/L
  - Current* limit: 430 mg/L
  - Final target: 395 mg/L (water quality criterion)
1. Identify sources of chloride to the sewer system.

2. Require significant industrial and commercial contributors to evaluate their chloride discharges and make recommendations for significantly reducing them, with the results of that evaluation being the basis for potential restrictions of chloride discharges.

3. Educate homeowners on the impact of chloride from residential softeners, discuss options available for increasing softener salt efficiency, and request voluntary reductions.

4. Recommend residential softener tune-ups on a voluntary basis.

5. Request voluntary support from local water softening businesses in the efforts described in subds. 2. and 3.

6. Educate licensed installers and self-installers of softeners on providing optional hard water for outside faucets for residences.
Traditional Approach: Build
Costs to Treat for Chloride

NPV: $400 million to $2.3 billion
→ 55% to 500% increase in sewer charges
Alternative: Prevention

• Less expensive and more efficient to reduce sources of salt to the plant

• Not just softener salt, but road salt too
Prevention Strategies

• Funding incentives
  • MMSD grants, rebates

• Outreach/education
  • One-on-one meetings
  • www.WiSaltWise.com
  • Today’s training

• Permits
  • General permit provision
• Ability to issue special permits if necessary to help comply with limits for certain pollutants, including chloride

• Ability to issue General Permit to category of commercial or industrial dischargers, if necessary
Salt Reduction Elsewhere

SLASH THE SALT!

It’s a Win-Win for Treatment Plant Customers

Here’s our problem...

Waukesha has hard water. You probably knew that already. So a lot of us have softeners to prevent lime buildup and to give us cleaner laundry. The problem is, softeners use salt to regenerate the resin during backwash. The chloride from the salt (sodium + chloride) discharges to the sanitary sewer and ends up at our Clean Water Treatment plants are designed to remove solids and break down organic wastes. But chloride can’t be removed by normal treatment processes. So chloride coming in the “front door” Plant leaves out the “back door”. If the chloride concentration gets too high in the river, it can affect aquatic life and get into the groundwater. Technology such as microfiltration and reverse osmosis is available to treatment plants for removing chloride, but is very expensive. Our Water Plant has a chloride limit in our DNR permit, and if chloride levels continue to increase, we could be facing violations and be forced to install more treatment. Sewer rates would go up a significant increase.

Scottsdale offers rebates for updated water softeners

Brittany Hargrave, PNI Published 8:58 a.m. MT June 20, 2014 | Updated 9:18 a.m. MT June 20, 2014

Beginning Tuesday, July 1, Scottsdale will offer a limited number of rebates on a first-come, first-served basis to sewer customers who remove or upgrade their inefficient water softeners.

The two-year pilot program aims to reduce salt in wastewater, which the city treats for groundwater recharge and golf-course landscape irrigation.
Increasing Attention

Madison Water Utility studies solutions for salt problem at West Side well

DEAN MOSMAN dmosman@madison.com  Feb 21, 2017  2

Rising salt levels threaten Twin Cities lakes by 2050

Twin Cities is a hot spot in a national study of lakes and road-salt runoff. It showed that salt concentrations in the Mississippi, mostly from road salt, have increased 81 percent since 1985.

By Josephine Marcotty Star Tribune  APRIL 11, 2017 — 9:44AM
EXERCISE 1: Evaluation of Facility Water Softening

A. Identify the systems in your facility that use soft water:
   - Hot and Cold (full line)
   - Hot Only
   - Domestic water (sinks, showers, restrooms)
   - Boilers
   - Chillers
   - Food service/cafeteria
   - Rinse water
   - Landscaping
   - Other (describe): ____________________________

Other chloride chemicals used: ____________________________

B. Softener Inventory

<table>
<thead>
<tr>
<th>Softener</th>
<th>Age (years)</th>
<th>Number of mineral tanks</th>
<th>Date of last resin replacement</th>
<th>Date of last elution study</th>
<th>Uses brine reclaim (Y/N)</th>
<th>Salt dosage (lbs./cubic ft.)</th>
<th>Softener capacity (grains)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>